

# 7

## The Living World

### (Life Science)

**Essential Question: How do the structure and function of cells support all life on earth?**

| Enduring Knowledge  | Science Concepts   | GE        | Evidence of Understanding   |
|---|--|-----------|---|
| <p><b><u>Survival of Organisms:</u> All living organisms and their component cells have identifiable characteristics that allow for survival.</b></p>           | <p>a. Cells contain structures that carry out survival functions.<br/>           b. The nucleus of a cell contains the genes. Every cell contains a complete set of genes for that organism.<br/>           c. Genes provide the instructions that direct the functions of the cell.<br/>           d. Plant cells have a cell wall in addition to a cell membrane. The cell wall has openings that allow materials to pass through to the cell, and the cell wall provides structural support for the cell.<br/>           e. Most plant cells contain chloroplasts where green pigment traps the energy from sunlight and transforms it from light energy into chemical energy.<br/>           f. Some materials can pass into and out of cells as concentrations move toward equilibrium (diffusion).</p> | <p>30</p> | <p>Conducting experiments that investigate how different concentrations of materials (inside vs. outside a cell) will cause water to flow into or out of cells<br/>           Examining cells under a microscope, and identifying cell wall, and chloroplasts, and by comparing the function of a common cell structure such as membrane in all cells with the function of a unique structure such as chloroplasts in plant cells<br/>           Examining cells under a microscope, identifying the nucleus, and explaining the relationship between genes (located in the nucleus) and traits</p> |
| <p><b><u>Chemical Reactions within Cells:</u> All living organisms and their component cells have identifiable characteristics that allow for survival.</b></p> | <p>a. Plant cells take in carbon dioxide and water and use the energy from sunlight to chemically change them to food (sugar) and oxygen.<br/>           b. All cells chemically change sugar (food) and oxygen into energy required to survive.<br/>           c. Energy is used by all cells to carry out functions for survival and some energy is transferred to the environment as heat.</p>  | <p>33</p> | <p>Recognizing that energy from the Sun is transferred and utilized in plant and animal cells through chemical changes and then transferred into other forms such as heat (e.g., using word equation)</p>   |

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| Concepts in Detail   | Potential Inquiries/Activities   | Resources/Notes |
|--|--|-----------------|
| <ul style="list-style-type: none"> <li>- Identify different survival functions of a cell: take in materials, make energy, grow, repair, get rid of waster, respond to environment.</li> <li>- The nucleus, cell membrane, cell wall, and chloroplast play roles in cell survival.</li> <li>- Locate where genes are in a cell.</li> <li>- Every non-sex cell has 1 complete set of genes for that cell.</li> <li>- Genes are copied in the nucleus and copies are sent out of the nucleus and into the cell.</li> <li>- The gene copies are used by the cell to direct survival functions.</li> <li>- Identify plant cell wall.</li> <li>- A cell wall has openings that allow materials to pass through to the cell.</li> <li>- A cell wall provides structural support for the cell.</li> <li>- Animal cells do not have cell walls.</li> <li>- Chloroplasts contain a green pigment.</li> <li>- Green pigment found in chloroplasts traps energy from sunlight and converts it into chemical energy - in this case, the chemical energy is food/sugar.</li> <li>- Energy can change forms.</li> </ul> <p>There a differences between low and high concentrations of materials.</p> <ul style="list-style-type: none"> <li>- Different concentrations will always move toward equilibrium, if possible.</li> <li>- Materials will move into and out of cell across cell membrane (because of different concentrations).</li> </ul> | <ul style="list-style-type: none"> <li>- Predict and explain how and why an egg with a dissolved shell placed in different solutions changes volume (fresh water, salt water, corn syrup).</li> <li>- Predict and explain how and why fresh water and salt water will affect the cells of an Elodea plant?</li> <li>- Activity: show diffusion by spraying perfume in 1 corner of room and observing the order in which students smell it.</li> <li>- Observe, diagram, and label various cells and cell parts.</li> </ul> |                 |
| <ul style="list-style-type: none"> <li>- Photosynthesis is the process in which a plant cell turns carbon dioxide and water into food (sugar) and oxygen with the energy from sunlight.</li> <li>- Photosynthesis is an example of a chemical reaction.</li> <li>- Respiration is the process in which a cell turns food (sugar) and oxygen into energy required for survival.</li> <li>- Respiration is an example of a chemical reaction.</li> <li>- All cells go through cellular respiration.</li> <li>- In order to survive, cells need to produce and use energy.</li> <li>- Cells do not use energy at 100% efficiency, so some is lost to the environment as heat.</li> </ul>  | <ul style="list-style-type: none"> <li>- Explain the relationship between the changes you see in the test tube and respiration (in test tube: yeast, water, thermometer, topped with a balloon).</li> </ul>  |                 |

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| <p><b><u>Interdependence within Ecosystems:</u> Energy enters an ecosystem in the form of sunlight and flows through the system to each cell. Matter interacts, changes, and recycles in an ecosystem. Populations of organisms survive by maintaining interdependent relationships with one another and by utilizing biotic and abiotic resources from the environment.</b></p> | <p>a. Plants transform energy from the Sun into stored chemical energy by changing carbon dioxide and water into sugar (food). Plants use or store the sugar they produce to satisfy their energy needs.</p> <p>b. All organisms release the energy stored in sugar (food) through a chemical change that requires oxygen and produces carbon dioxide and water in addition to energy. Some consumers eat plants directly (herbivores). Some consumers eat other animals (carnivores) and use the energy from the plant's sugar food that was stored in the animal's cells. Some consumers eat both plant and animal material (omnivore).</p>     | <p>34</p> | <p>Describing how light is transformed into chemical energy by producers and how this chemical energy is used by all organisms to sustain life (e.g., using a word equation)</p>   |
| <p><b><u>Life Cycles and Reproduction:</u> All living organisms and their component cells have identifiable characteristics that allow for survival.</b></p>   | <p>a. Cells only come from other cells.</p> <p>b. Cells repeatedly divide to make more cells for growth and repair.</p> <p>c. During cell reproduction, genes duplicate so that each new cell will have an identical set of genes.</p> <p>d. When cells divide, they are reproducing asexually.</p> <p>e. In asexual reproduction, the new cell (organism) is identical to the parent.</p> <p>f. Some complete organisms can reproduce asexually (e.g., budding).</p> <p>g. In asexual reproduction, the new cell (organism) is identical to the parent.</p> <p>h. Half of an individual's traits come from one parent — half from the other.</p> | <p>31</p> | <p>Explaining that cells come only from other living cells and that genes duplicate in the process of cell division producing an identical copy of the original cell</p> <p>Describing the relationship between human growth and cell division</p> |

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| <ul style="list-style-type: none"> <li>- Plants, as producers, turn energy from the Sun into stored chemical energy through the process of photosynthesis (carbon dioxide and water ---&gt; food (sugar) and oxygen).</li> <li>- Plants use their food (sugar) for energy or store it.</li> <li>- Producers and consumers turn food (sugar) into energy, or store the food (sugar) in their own cells.</li> <li>- The process of cellular respiration produces energy from food (sugar) and oxygen. It also produces the waste products of carbon dioxide and water.</li> <li>- Word equation: food (sugar) and oxygen ---&gt; energy and carbon dioxide and water.</li> <li>- Herbivores are consumers that only eat plants. They use the plant's food (sugar) for energy or store the sugar in their own cells.</li> <li>- Carnivores are consumers that only eat animals. They use the sugar that was stored in the animal cells for energy or store the sugar in their own cells.</li> <li>- Omnivores are consumers that eat both plants and animals.</li> </ul> | <p><u>Activity</u>: journaling, observing outside environment, explain how existence of Sun supports the life they are observing.</p> |                 |
| <ul style="list-style-type: none"> <li>- New cells only come from other living cells.</li> <li>- When multicellular organisms need to repair a part of themselves, their cells produce new cells to replace old, damaged cells.</li> <li>- To grow and develop, the cells of multicellular organisms produce new cells.</li> <li>- Cell division is the process of a cell duplicating its contents and splitting in two.</li> <li>- New cells have the same exact genes as the parent cell.</li> <li>- The parent cell makes a copy of its genes before dividing.</li> <li>- Cell reproduction and cell division are the same thing.</li> <li>- Asexual reproduction is when one organism reproduces by making an exact copy of itself.</li> <li>- Cell division is asexual reproduction.</li> </ul>  | <p><u>Activity</u>: observe yeast cell division under microscope.</p>   |                 |



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| <ul style="list-style-type: none"><li>- In asexual reproduction, the new cell or organism has the same genes as the parent cell or organism, so they are identical.</li><li>- Some organisms can reproduce asexually (e.g., cell division, rooting of a plant).</li><li>- Sexual reproduction is when 1/2 of the genes from each parent combine to form a new organism.</li></ul> |  |  |
|---|--|--|